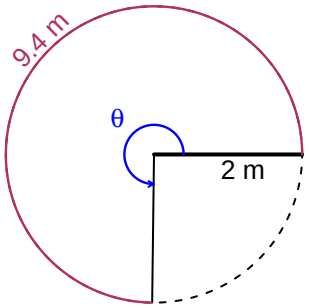
Name: Date:

# Trig Final (SLTN v618)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 2 meters. The arc length is 9.4 meters. What is the angle measure in radians?

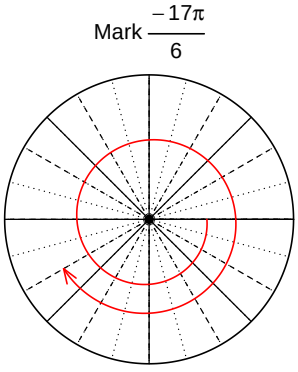



$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

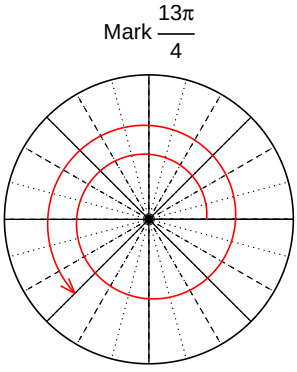
$\theta = 4.7$ radians.

### Question 2

Consider angles $\frac{-17\pi}{6}$ and $\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-17\pi}{6}\right)$ and $\cos\left(\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).




Find $\sin(-17\pi/6)$




Find $\cos(13\pi/4)$

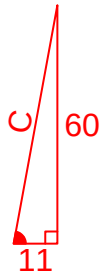
$\sin(-17\pi/6) = \frac{-1}{2}$

$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$

**Question 3**

If $\tan(\theta) = \frac{-60}{11}$, and $\theta$ is in quadrant IV, determine an exact value for $\cos(\theta)$.

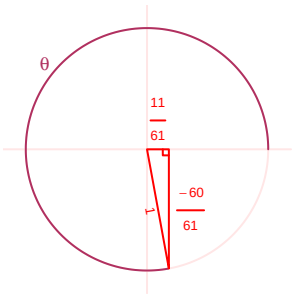
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.




Solve the Pythagorean Equation

$$11^2 + 60^2 = C^2$$
$$C = \sqrt{11^2 + 60^2}$$
$$C = 61$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.




$$\cos(\theta) = \frac{11}{61}$$

**Question 4**

A mass-spring system oscillates vertically with a midline at $y = -5.59$ meters, an amplitude of 4.45 meters, and a frequency of 8.27 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height ($y$ in meters) as a function of time ($t$ in seconds).

Any of these equations would get full credit.

$$y = -4.45\cos(2\pi 8.27t) - 5.59$$

or

$$y = -4.45\cos(16.54\pi t) - 5.59$$

or

$$y = -4.45\cos(51.96t) - 5.59$$